

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method of fabricating an SOI wafer comprising:
an insulating film formation step of forming an insulating film on a first main surface of at least one of a first substrate, and a second substrate composed of silicon single crystal;
a separatory ion implanted layer formation step of forming a separatory ion implanted layer by implanting ions from an ion implantation surface on the first main surface side of the second substrate;
a bonding step of bonding the second substrate having the separatory ion implanted layer formed therein and the first substrate while opposing the first main surfaces with each other, and placing the insulating film in between;
a separation step of separating a bonded silicon single crystal film, later becoming an SOI layer, from the second substrate at a position of the separatory ion implanted layer, the separation step forming a separation surface of the bonded silicon single crystal film with a roughness (Rms) of 4.5 nm or less; and
a planarization step of planarizing having the separation surface side of the bonded silicon single crystal film so as to produce the SOI layer,
~~wherein, in wherein~~ the separatory ion implanted layer formation step further includes, based on a desired thickness of the SOI layer, adjusting a depth of formation of the separatory ion implanted layer measured from the ion implantation surface ~~is adjusted~~ through control of a magnitude of an ion implantation energy ~~in order to adjust a thickness of the bonded silicon single crystal film depending on a thickness of the SOI layer to be~~ obtained, and

wherein a dose of the ion implantation is ~~set smaller~~ lowered as the depth of formation of the separatory ion implanted layer measured from the ion implantation surface becomes ~~smaller~~ less, the dose of the ion implantation being such that the separation surface of the bonded silicon single crystal film formed in the separation step has the roughness (Rms) of 4.5 nm or less.

2. (Original) The method of fabricating an SOI wafer as claimed in Claim 1, wherein the planarization step further comprises a polishing step of polishing the separation surface side of the bonded silicon single crystal film.

3. (Currently Amended) The method of fabricating an SOI wafer as claimed in Claim 2, wherein, in the polishing step, polishing stock removal of the separation surface side of the bonded silicon single crystal film is based on the ~~set smaller~~ as surface roughness (Rms) of the separation surface of the bonded silicon single crystal film, wherein less polishing stock removal is conducted when the roughness of the separation surface is lowered becomes smaller.

4. (Currently Amended) The method of fabricating an SOI wafer as claimed in Claim 3, wherein the dose of the ion implantation is ~~set smaller~~, and the polishing stock removal, in the polishing step, of the separation surface side of the bonded silicon single crystal film is ~~set smaller~~, as are based on the thickness of the SOI layer to be obtained, wherein less polishing stock removal is conducted when the roughness of the separation surface is lowered becomes smaller.

5. (Previously Presented) The method of fabricating an SOI wafer as claimed in Claim 1, wherein the insulating film is a silicon oxide film.

6. (Previously Presented) The method of fabricating an SOI wafer as claimed in Claim 2, wherein the insulating film is a silicon oxide film.

7. (Previously Presented) The method of fabricating an SOI wafer as claimed in Claim 3, wherein the insulating film is a silicon oxide film.

8. (Previously Presented) The method of fabricating an SOI wafer as claimed in Claim 4, wherein the insulating film is a silicon oxide film.

9. (New) The method of fabricating an SOI wafer as claimed in Claim 1, wherein the planarization step further comprises polishing the separation surface of the bonded silicon single crystal, wherein the SOI layer has a layer thickness uniformity of 1.5 nm or less following polishing.

10. (New) The method of fabricating an SOI wafer as claimed in Claim 1, wherein the dose of the ion implantation is from $3 \times 10^{16}/\text{cm}^2$ to $5 \times 10^{16}/\text{cm}^2$.

11. (New) The method of fabricating an SOI wafer as claimed in Claim 1, wherein the roughness (Rms) of 4.5 nm or less for the separation surface of the bonded silicon single crystal film is obtained at the separation of the bonded silicon single crystal film from the second substrate.